Separation of prokaryotic cells from deep sediments

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Quantitative separation of prokaryotic cells from sediment would greatly aid many categories of deep-biosphere studies. It could substantially improve the quantification of cell abundances because cells attached to particles may be covered or obscured by chemical reactions between sediment and stains or molecular probes.
Quantitative cell separation may also aid investigations on the metabolic state of cells (live, dead, active, dormant), as live/dead stains and FISH probes do interact with sediment particles. It is also a crucial first step for chemical assays of various populational properties, such as protein turnover.

We are testing several different approaches to dislodge and separate the cells from the sediment without lysing them. These approaches include the use of different detergents, isoelectric focusing, electro osmosis, molecular magnetic probing, and density gradient centrifugation. To test these techniques a variety of natural and artificial sediments spiked with different cell cultures of known densities will be used.